CENTRAL STAR FORMATION IN 'SO' GALAXIES

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As a class, SO galaxies are characterized by a lack of resolved bright stars in the disk. However, several lines of evidence support the hypothesis that a high rate of star formation is occurring at the centers of some SO galaxies.

(1) Many of the warmest, most powerful far infrared sources in nearby bright galaxies occur in SO galaxies (Dressel 1988, Ap. J., 329, L69).

(2) The ratios of radio continuum flux to far infrared flux for these SO galaxies are comparable to the ratios found for spiral galaxy disks and for star-burst galaxies.

(3) VLA maps of some of these SO galaxies show that the radio continuum emission originates in the central few kiloparsecs. It is diffuse or clumpy, unlike the radio sources in "active" SO galaxies, which are either extremely compact or have jet-lobe structures. (See Figure 1.)

(4) Imaging of some of these galaxies at 10.8 microns shows that the infrared emission is also centrally concentrated. (See Figure 2.)

(5) Many of the infrared-powerful SO galaxies are Markarian galaxies. In only one case in this sample is the powerful ultraviolet emission known to be generated by a Seyfert nucleus.

(6) Optical spectra of the central few kiloparsecs of these SO galaxies generally show deep Balmer absorption lines characteristic of A stars, and Hß emission suggestive of gas heated by O stars. (See Figure 3.)

A key question to our understanding of these galaxies is whether they "really" are SO galaxies, or at least would have been recognized as SO galaxies before the episode of central star formation began. Some of Nilson's classifications (used here) have been confirmed by Sandage or de Vaucouleurs and collaborators from better plates; some of the galaxies may be misclassified Sa galaxies (the most frequent hosts of central star formation); some are apparently difficult to classify because of mixed characteristics, faint "non-SO" features, or peculiarities (due to the central star-formation process?). More optical imaging is needed to characterize the host galaxies and to study the evolution of their star-forming regions.

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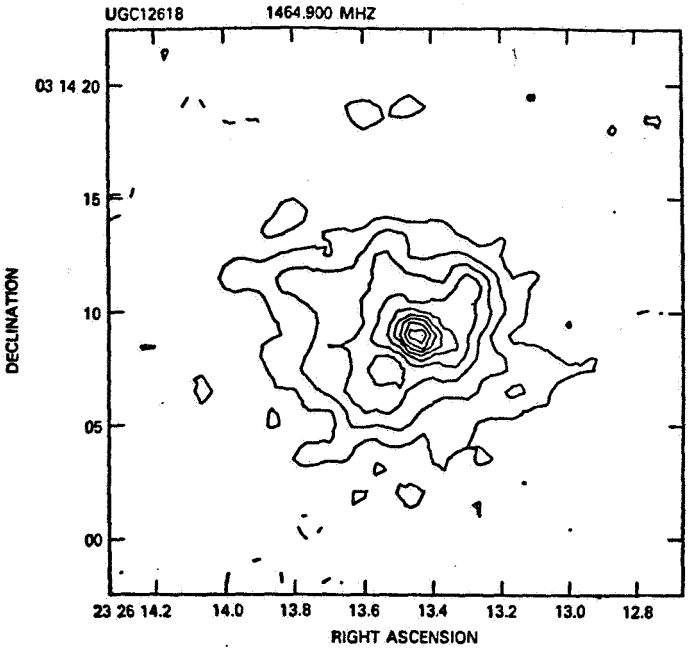

Figure 1: VLA map of UGC 12618 made at 1465 MHz in A array. Contours indicate linear increments in brightness. Beam FWHM is 1.3 arcsec.

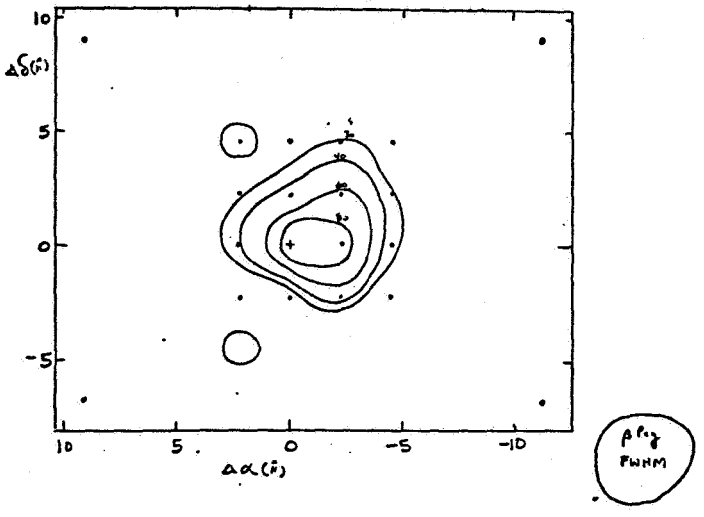

Figure 2: IRTF image of UGC 12618 at 10.8 microns. Contour intervals are 30, 40, 60, and 80 mJy/pixel; σ = 15 mJy/pixel. The cross indicates the optical center of the galaxy. Tick marks indicate distance from the galaxy center in 5 arcsec increments in right ascension and declination. (The scale is the same as in Figure 1.) FWHM for a point source is shown at the lower right. One pixel = 4.3" x 4.3".

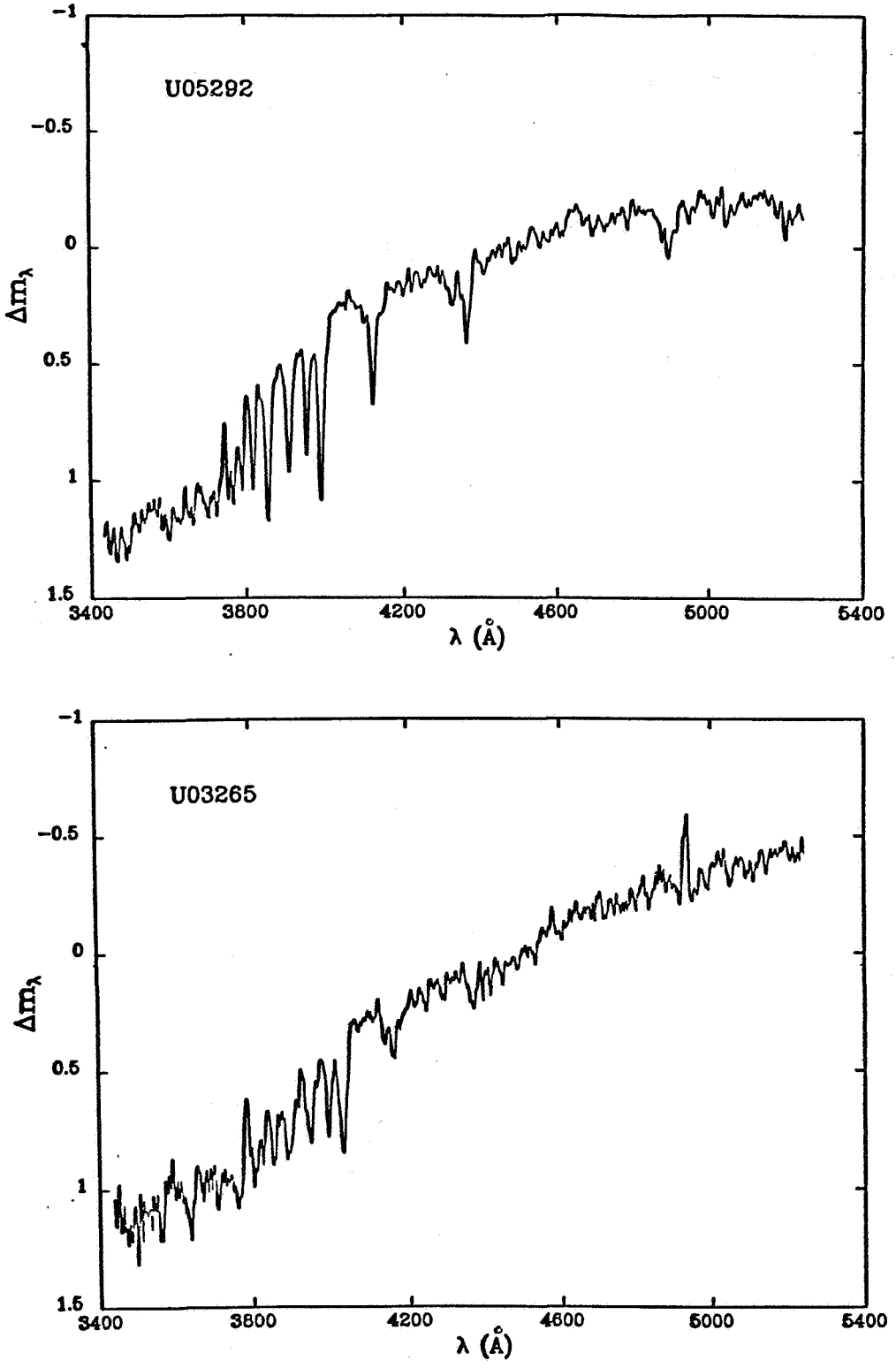

Figure 3. Optical spectra of UGC 05292 (S0) and UGC 03265 (SB0) in the rest frame of the observer. Hβ is seen in absorption in the former and in emission in the latter, and higher order Balmer lines are seen in absorption in both.